



Sequence Listing 06-03.txt
SEQUENCE LISTING

<110> KOREA RESEARCH INSTITUTE OF BIOSCIENCE AND BIOTECHNOLOGY
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SOHN, Jung-Hoon
KIM, So-Young

<120> METHOD FOR SCREENING OF A LIPASE HAVING IMPROVED ENZYMATIC ACTIVITY USING YEAST SURFACE DISPLAY VECTOR AND THE LIPASE

<130> 26666U

<140> 10/527,438

<141> 2005-03-11

<150> KR 2002-55575

<151> 2002-09-13

<160> 18

<170> PatentIn version 3.2

<210> 1

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> CALB primer 1

<400> 1

ggctttcag ccactcctt ggtgaag

27

<210> 2

<211> 23

<212> DNA

<213> Artificial Sequence

<220>

<223> CALB primer 2

<400> 2

gcggatcc tc aggggtgac gat

23

<210> 3

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> CALB primer 3

<400> 3

gcggatcc gggtgacgat gccggag

27

<210> 4

<211> 19

<212> DNA

<213> Artificial Sequence

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<220>		
<223>	GPD-err primer	
<400>	4	
	gcagagctaa ccaataagg	19
<210>	5	
<211>	19	
<212>	DNA	
<213>	Artificial Sequence	
<220>		
<223>	T-O primer	
<400>	5	
	tgcagttgaa cacaaccac	19
<210>	6	
<211>	1023	
<212>	DNA	
<213>	Candida antarctica	
<220>		
<221>	sig_peptide	
<222>	(1)..(51)	
<223>	secretion signal	
<400>	6	
	atgaatatat tttacatatt tttgttttg ctgtcattcg ttcaaggtac cgccactccc	60
	tttgtgaagc gtctgccttc cggttcggac cctgcctttt cgtagccaa gtcggtgctc	120
	gatgcgggtc tgacctgcca gggtgcttcg ccattctcg tctccaaacc catccttctc	180
	gtccccggaa cccgcaccac aggtccacag tcgttcgact cgaactggat cccctctct	240
	gcgcagctgg gttcacacacc ctgctggatc tcaccccgcc cggtcatgct caacgacacc	300
	caggtaaca cggagtacat ggtcaacgcc atcaccacgc tctacgctgg ttcgggcaac	360
	aacaagcttc ccgtgctcac ctggtcccag ggtggcttgg ttgcacagtg gggtctgacc	420
	ttcttccca gtatcaggc caaggtcgat cgacttatgg ccttgcgcc cgactacaag	480
	ggcaccgtcc tcgcccggccc tctcgatgca ctcgcggta gtgcaccctc cgtatggcag	540
	caaaccaccg gttcggcact cactaccgca ctccgaaacg caggtggtct gacccagatc	600
	gtgcccacca ccaacctcta ctcggcgacc gacgagatcg ttcagcctca ggtgtccaa	660
	tcgccactcg actcatccta cctttcaac gggagaacg tccaggcaca ggctgtgtgt	720
	gggcccgtgt tcgtcatcga ccatgcaggc tcgctcacct cgcaattctc ctacgtcg	780
	ggtcgatccg ccctgcgctc caccacgggc caggctcgta gtgcagacta tggcattacc	840
	gactgcaacc ctcttccgc caatgatctg actcccggagc aaaagggtcgc cgccgctgc	900
	ctccggcgc cggcgctgc agccatcgat gcgggtccaa agcagaactg cgagccgac	960

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ctcatgccct acgcccggcc cttgcagta ggcaaaagga cctgctccgg catcgtcacc 1020
ccc 1023

<210> 7
<211> 1023
<212> DNA
<213> Candida antarctica

<220>
<221> sig_peptide
<222> (1)..(51)
<223> secretion signal

<400> 7
atgaatatatt tttacatatt tttgttttgc ctgtcattcg ttcaaggtac cgccactcct 60
tttgtgaagc gtctgccttc cggttcggac cctgcctttt cgcaagccaa gtcggtgctc 120
gatgcgggtc tgacctgcca aggtgcttcg ccatcctcgg tctccaaacc catccttctc 180
gtccccggaa ccggcaccac aggtccacag tcgttcgact cgaactggat cccctctct 240
gchgagctgg gttacacacc ctgctggatc tcaccccccgc cgttcatgct caacgacacc 300
caggtcaaca cggagtacat ggtcaacgccc atcaccacgc tctacgctgg ttcgggcaac 360
aacaagcttc ccgtgctcac ctggtcccag ggtggtctgg ttgcacagtg gggctgacc 420
ttcttccca gtatcagggtc caagggtcgat cgacttatgg cctttgcgcc cgactacaag 480
ggcacccgtcc tcgcccggccc tctcgatgca ctcgcgggta gtgcaccctc cgtatggcag 540
caaaccaccg gttcggcact cactaccgca ctccgaaacg caggtggtct gacccagatc 600
gtgcccacca ccaacctcta ctcggcgacc gacgagatcg ttcagcctca ggtgtccaa 660
tcgcccactcg actcatccta cctttcaac ggaaagaacg tccaggcaca ggctgtgtgt 720
gggcccgcagt tcgtcatgca ccatgcaggc tcgctcacct cgcaattctc ctacgtcg 780
ggtcgatccg ccctgcgctc caccacgggc caggctcgta gtgcggacta tggcattacg 840
gactgcaacc ctcttcccgcaaatgatctg actcccgagc aaaaggtcgc cgccgctg 900
ctcccgccgc cggcggctgc agccatcgta gcgggtccaa agcagaactg cgagcccgac 960
ctcatgccct acgcccggcc cttgcagta ggcaaaagga cctgctccgg catcgtcacc 1020
ccc 1023

<210> 8
<211> 1023
<212> DNA
<213> Candida antarctica

<220>
<221> sig_peptide
<222> (1)..(51)

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<223> secretion signal

<400> 8		
atgaatatata tttacatatt tttgttttg ctgtcattcg ttcaaggtac cgccactcct	60	
tttgtgaagc gtctgccttc cgggtcgac cctgccttt cgcaagccaa gtcggtgctc	120	
gatgcgggtc tgacctgcca gggtgcttcg ccattcctcgg tctccaaacc catccttctc	180	
gtccccgaa cccgcaccac aggtccacag tcgttcgact cgaactggat cccctctct	240	
gcccggctgg gttacacacc ctgctggatc tcaccccccgc cgttcatgct caacgacacc	300	
caggtaaca cggagtacat ggtcaacgcc atcaccacgc tctacgctgg ttccggcaac	360	
aacaagcttc ccgtgctcac ctggtcccag ggttgtctgg ttgcacagtg gggtgtgacc	420	
ttcttccca gtatcagggtc caagggtcgat cgacttatgg cctttgcgcc cgactacaag	480	
ggcaccgtcc tcgcccggccc tctcgatgca ctcgcggta gtgcaccctc cgtatggcag	540	
caaaccaccg gttcggcact cactaccgca ctccgaaacg caggtggtct gacccagatc	600	
gtgcccacca ccaacctcta ctcggcgacc gacgagatcg ttcagcctca ggtgtccaac	660	
tcgcccactcg actcatccta cctttcaac ggaaagaacg tccaggcaca ggctgtgtgt	720	
ggccgcagt tcgtcatgca ccatgcaggc tcgctcacct cgcatgtctc ctacgtcg	780	
gtcgatccg ccctgcgctc caccacggc caggctcgta gtgcagacta tggcattacg	840	
gactgcaacc ctcttccgc caatgatctg actcccggc aaaaggtcgc cgccgctgc	900	
ctcctggcgc cggcgctgc agccatcggt gcgggtccaa agcagaactg cgagccgcac	960	
ctcatgcct acgcccggccc ctttgcagta ggcaaaagga cctgctccgg catcgtaacc	1020	
ccc	1023	

<210> 9

<211> 341

<212> PRT

<213> Candida antarctica

<220>

<221> SIGNAL

<222> (1)..(17)

<223> secretion signal

<400> 9

Met Asn Ile Phe Tyr Ile Phe Leu Phe Leu Leu Ser Phe Val Gln Gly
 1 5 10 15

Thr Ala Thr Pro Leu Val Lys Arg Leu Pro Ser Gly Ser Asp Pro Ala
 20 25 30

Phe Ser Gln Pro Lys Ser Val Leu Asp Ala Gly Leu Thr Cys Gln Gly
 35 40 45

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Ala Ser Pro Ser Ser Val Ser Lys Pro Ile Leu Leu Val Pro Gly Thr
50 55 60

Gly Thr Thr Gly Pro Gln Ser Phe Asp Ser Asn Trp Ile Pro Leu Ser
65 70 75 80

Ala Gln Leu Gly Tyr Thr Pro Cys Trp Ile Ser Pro Pro Pro Phe Met
85 90 95

Leu Asn Asp Thr Gln Val Asn Thr Glu Tyr Met Val Asn Ala Ile Thr
100 105 110

Thr Leu Tyr Ala Gly Ser Gly Asn Asn Lys Leu Pro Val Leu Thr Trp
115 120 125

Ser Gln Gly Gly Leu Val Ala Gln Trp Gly Leu Thr Phe Phe Pro Ser
130 135 140

Ile Arg Ser Lys Val Asp Arg Leu Met Ala Phe Ala Pro Asp Tyr Lys
145 150 155 160

Gly Thr Val Leu Ala Gly Pro Leu Asp Ala Leu Ala Val Ser Ala Pro
165 170 175

Ser Val Trp Gln Gln Thr Thr Gly Ser Ala Leu Thr Thr Ala Leu Arg
180 185 190

Asn Ala Gly Gly Leu Thr Gln Ile Val Pro Thr Thr Asn Leu Tyr Ser
195 200 205

Ala Thr Asp Glu Ile Val Gln Pro Gln Val Ser Asn Ser Pro Leu Asp
210 215 220

Ser Ser Tyr Leu Phe Asn Gly Lys Asn Val Gln Ala Gln Ala Val Cys
225 230 235 240

Gly Pro Leu Phe Val Ile Asp His Ala Gly Ser Leu Thr Ser Gln Phe
245 250 255

Ser Tyr Val Val Gly Arg Ser Ala Leu Arg Ser Thr Thr Gly Gln Ala
260 265 270

Arg Ser Ala Asp Tyr Gly Ile Thr Asp Cys Asn Pro Leu Pro Ala Asn
275 280 285

Asp Leu Thr Pro Glu Gln Lys Val Ala Ala Ala Leu Pro Ala Pro
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290

295

300

Ala Ala Ala Ala Ile Val Ala Gly Pro Lys Gln Asn Cys Glu Pro Asp
305 310 315 320

Leu Met Pro Tyr Ala Arg Pro Phe Ala Val Gly Lys Arg Thr Cys Ser
325 330 335

Gly Ile Val Thr Pro
340

<210> 10
<211> 341
<212> PRT
<213> Candida antarctica

<220>
<221> SIGNAL
<222> (1)..(17)
<223> secretion signal

<400> 10

Met Asn Ile Phe Tyr Ile Phe Leu Phe Leu Leu Ser Phe Val Gln Gly
1 5 10 15

Thr Ala Thr Pro Leu Val Lys Arg Leu Pro Ser Gly Ser Asp Pro Ala
20 25 30

Phe Ser Gln Pro Lys Ser Val Leu Asp Ala Gly Leu Thr Cys Gln Gly
35 40 45

Ala Ser Pro Ser Ser Val Ser Lys Pro Ile Leu Leu Val Pro Gly Thr
50 55 60

Gly Thr Thr Gly Pro Gln Ser Phe Asp Ser Asn Trp Ile Pro Leu Ser
65 70 75 80

Ala Gln Leu Gly Tyr Thr Pro Cys Trp Ile Ser Pro Pro Pro Phe Met
85 90 95

Leu Asn Asp Thr Gln Val Asn Thr Glu Tyr Met Val Asn Ala Ile Thr
100 105 110

Thr Leu Tyr Ala Gly Ser Gly Asn Asn Lys Leu Pro Val Leu Thr Trp
115 120 125

Ser Gln Gly Gly Leu Val Ala Gln Trp Gly Leu Thr Phe Phe Pro Ser
130 135 140

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Ile Arg Ser Lys Val Asp Arg Leu Met Ala Phe Ala Pro Asp Tyr Lys
145 150 155 160

Gly Thr Val Leu Ala Gly Pro Leu Asp Ala Leu Ala Val Ser Ala Pro
165 170 175

Ser Val Trp Gln Gln Thr Thr Gly Ser Ala Leu Thr Thr Ala Leu Arg
180 185 190

Asn Ala Gly Gly Leu Thr Gln Ile Val Pro Thr Thr Asn Leu Tyr Ser
195 200 205

Ala Thr Asp Glu Ile Val Gln Pro Gln Val Ser Asn Ser Pro Leu Asp
210 215 220

Ser Ser Tyr Leu Phe Asn Gly Lys Asn Val Gln Ala Gln Ala Val Cys
225 230 235 240

Gly Pro Gln Phe Val Ile Asp His Ala Gly Ser Leu Thr Ser Gln Phe
245 250 255

Ser Tyr Val Val Gly Arg Ser Ala Leu Arg Ser Thr Thr Gly Gln Ala
260 265 270

Arg Ser Ala Asp Tyr Gly Ile Thr Asp Cys Asn Pro Leu Pro Ala Asn
275 280 285

Asp Leu Thr Pro Glu Gln Lys Val Ala Ala Ala Ala Leu Pro Ala Pro
290 295 300

Ala Ala Ala Ala Ile Val Ala Gly Pro Lys Gln Asn Cys Glu Pro Asp
305 310 315 320

Leu Met Pro Tyr Ala Arg Pro Phe Ala Val Gly Lys Arg Thr Cys Ser
325 330 335

Gly Ile Val Thr Pro
340

<210> 11
<211> 341
<212> PRT
<213> Candida antarctica

<220>
<221> SIGNAL
<222> (1)..(24)
<223> secretion signal

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<400> 11

Met Asn Ile Phe Tyr Ile Phe Leu Phe Leu Leu Ser Phe Val Gln Gly
1 5 10 15

Thr Ala Thr Pro Leu Val Lys Arg Leu Pro Ser Gly Ser Asp Pro Ala
20 25 30

Phe Ser Gln Pro Lys Ser Val Leu Asp Ala Gly Leu Thr Cys Gln Gly
35 40 45

Ala Ser Pro Ser Ser Val Ser Lys Pro Ile Leu Leu Val Pro Gly Thr
50 55 60

Gly Thr Thr Gly Pro Gln Ser Phe Asp Ser Asn Trp Ile Pro Leu Ser
65 70 75 80

Ala Gln Leu Gly Tyr Thr Pro Cys Trp Ile Ser Pro Pro Pro Phe Met
85 90 95

Leu Asn Asp Thr Gln Val Asn Thr Glu Tyr Met Val Asn Ala Ile Thr
100 105 110

Thr Leu Tyr Ala Gly Ser Gly Asn Asn Lys Leu Pro Val Leu Thr Trp
115 120 125

Ser Gln Gly Gly Leu Val Ala Gln Trp Gly Leu Thr Phe Phe Pro Ser
130 135 140

Ile Arg Ser Lys Val Asp Arg Leu Met Ala Phe Ala Pro Asp Tyr Lys
145 150 155 160

Gly Thr Val Leu Ala Gly Pro Leu Asp Ala Leu Ala Val Ser Ala Pro
165 170 175

Ser Val Trp Gln Gln Thr Thr Gly Ser Ala Leu Thr Thr Ala Leu Arg
180 185 190

Asn Ala Gly Gly Leu Thr Gln Ile Val Pro Thr Thr Asn Leu Tyr Ser
195 200 205

Ala Thr Asp Glu Ile Val Gln Pro Gln Val Ser Asn Ser Pro Leu Asp
210 215 220

Ser Ser Tyr Leu Phe Asn Gly Lys Asn Val Gln Ala Gln Ala Val Cys
225 230 235 240

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Gly Pro Gln Phe Val Ile Asp His Ala Gly Ser Leu Thr Ser Gln Phe
245 250 255

Ser Tyr Val Val Gly Arg Ser Ala Leu Arg Ser Thr Thr Gly Gln Ala
260 265 270

Arg Ser Ala Asp Tyr Gly Ile Thr Asp Cys Asn Pro Leu Pro Ala Asn
275 280 285

Asp Leu Thr Pro Glu Gln Lys Val Ala Ala Ala Leu Leu Ala Pro
290 295 300

Ala Ala Ala Ala Ile Val Ala Gly Pro Lys Gln Asn Cys Glu Pro Asp
305 310 315 320

Leu Met Pro Tyr Ala Arg Pro Phe Ala Val Gly Lys Arg Thr Cys Ser
325 330 335

Gly Ile Val Thr Pro
340

<210> 12

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> CALB primer 4

<400> 12

ctcatatgct accttccggc tcggac

26

<210> 13

<211> 21

<212> PRT

<213> Artificial Sequence

<220>

<223> a-amylase secretion signal

<400> 13

Met Met Val Ala Trp Trp Ser Leu Phe Leu Tyr Gly Leu Gln Val Ala
1 5 10 15

Ala Pro Ala Leu Ala
20

<210> 14

<211> 317

<212> PRT

<213> Candida antarctica

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<400> 14

Leu Pro Ser Gly Ser Asp Pro Ala Phe Ser Gln Pro Lys Ser Val Leu
1 5 10 15

Asp Ala Gly Leu Thr Cys Gln Gly Ala Ser Pro Ser Ser Val Ser Lys
20 25 30

Pro Ile Leu Leu Val Pro Gly Thr Gly Thr Thr Gly Pro Gln Ser Phe
35 40 45

Asp Ser Asn Trp Ile Pro Leu Ser Ala Gln Leu Gly Tyr Thr Pro Cys
50 55 60

Trp Ile Ser Pro Pro Pro Phe Met Leu Asn Asp Thr Gln Val Asn Thr
65 70 75 80

Glu Tyr Met Val Asn Ala Ile Thr Thr Leu Tyr Ala Gly Ser Gly Asn
85 90 95

Asn Lys Leu Pro Val Leu Thr Trp Ser Gln Gly Gly Leu Val Ala Gln
100 105 110

Trp Gly Leu Thr Phe Phe Pro Ser Ile Arg Ser Lys Val Asp Arg Leu
115 120 125

Met Ala Phe Ala Pro Asp Tyr Lys Gly Thr Val Leu Ala Gly Pro Leu
130 135 140

Asp Ala Leu Ala Val Ser Ala Pro Ser Val Trp Gln Gln Thr Thr Gly
145 150 155 160

Ser Ala Leu Thr Thr Ala Leu Arg Asn Ala Gly Gly Leu Thr Gln Ile
165 170 175

Val Pro Thr Thr Asn Leu Tyr Ser Ala Thr Asp Glu Ile Val Gln Pro
180 185 190

Gln Val Ser Asn Ser Pro Leu Asp Ser Ser Tyr Leu Phe Asn Gly Lys
195 200 205

Asn Val Gln Ala Gln Ala Val Cys Gly Pro Leu Phe Val Ile Asp His
210 215 220

Ala Gly Ser Leu Thr Ser Gln Phe Ser Tyr Val Val Gly Arg Ser Ala
225 230 235 240

Leu Arg Ser Thr Thr Gly Gln Ala Arg Ser Ala Asp Tyr Gly Ile Thr
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245

250

255

Asp Cys Asn Pro Leu Pro Ala Asn Asp Leu Thr Pro Glu Gln Lys Val
 260 265 270

Ala Ala Ala Ala Leu Leu Ala Pro Ala Ala Ala Ala Ile Val Ala Gly
 275 280 285

Pro Lys Gln Asn Cys Glu Pro Asp Leu Met Pro Tyr Ala Arg Pro Phe
 290 295 300

Ala Val Gly Lys Arg Thr Cys Ser Gly Ile Val Thr Pro
 305 310 315

<210> 15

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> LQ53 primer

<400> 15

gctgtgtgtg ggccgcagtt cgtcatcg

28

<210> 16

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> LQ35 primer

<400> 16

gcatggtcga tgacgaactg cggcccacac

30

<210> 17

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> LP53 primer

<400> 17

gtcgccgcgg ctgcgctccc ggcgccggcg

30

<210> 18

<211> 29

<212> DNA

<213> Artificial Sequence

<220>

<223> LP35 primer

Sequence Listing 06-03.txt

<400> 18
ctgcagccgc cggcgccggg agcgcagcc

29